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C3N N3A3A N3A3D N3A3E N3A3G N3A3X N3BX N3B7
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B8P PE2H
C1B BBL
U1S S1014 S1305 S1813

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GB 2246566 A	GB 2139609 A	GB 2137609 A
GB 1347745 A	GB 1003098 A	GB 0986623 A
GB 0850966 A	GB 0770435 A	GB 0744621 A
GB 0591403 A	GB 0558706 A	GB 0470345 A
GB 0414407 A	GB 0397219 A	GB 0305739 A
GB 0195263 A	GB 0179055 A	GB 0113656 A

(58) Field of Search
UK CL (Edition L) A2B BMA9 , B2E EKB EM , B8C CWP1 CWS5 , B8P PE2B PE2D PE2H PK14 , C1B BBL , C3N
ONLINE DATABASES : WPI

(54) **Organic material**

(57) An organic material for use as a growing medium for plants or animals or as a packaging material comprises one of the following residue materials: sawdust, wood chips, bark, wood waste, charcoal, peat, shells, olive residues, coir dust, coffee hulls, coconut fibre, sunflower husks, cottonseed husks, hazelnut shells, bagasse, hemp, straw, flax, plant stalks, paper waste, malt sprouts, rice husks or municipal waste. Coir dust is preferred.

The material may be formed into packaging members or pellets, for use as a packaging material. The packaging material may be formed either by mixing the residue with a binding agent or by providing the residue between layers which act as skins, or by adhesion to a substrate.

The material may be biodegradable an/or used as a fertiliser.

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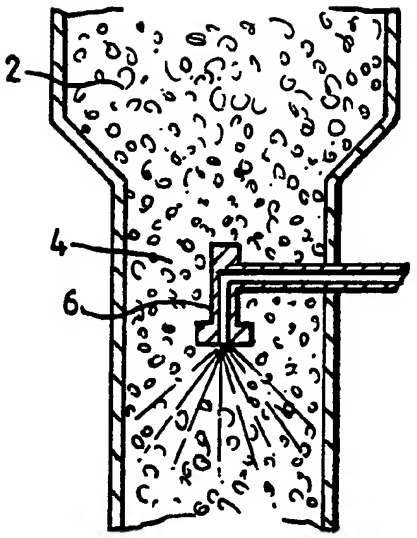

FIG.1

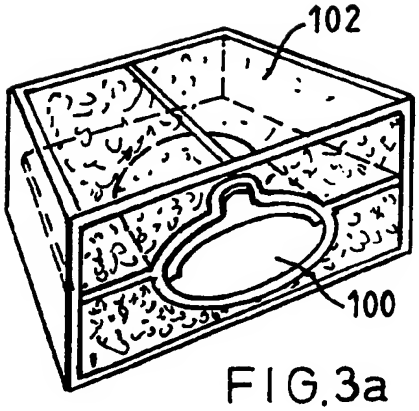

FIG.3a

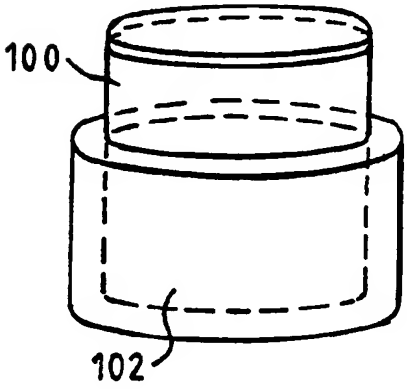

FIG.3b

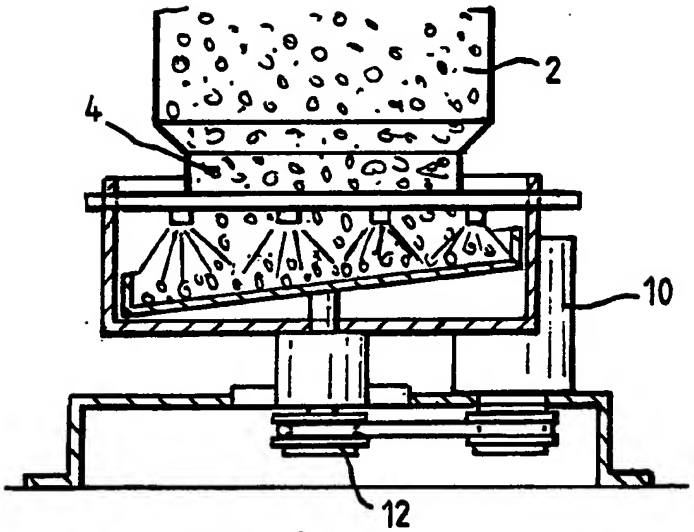

FIG. 2

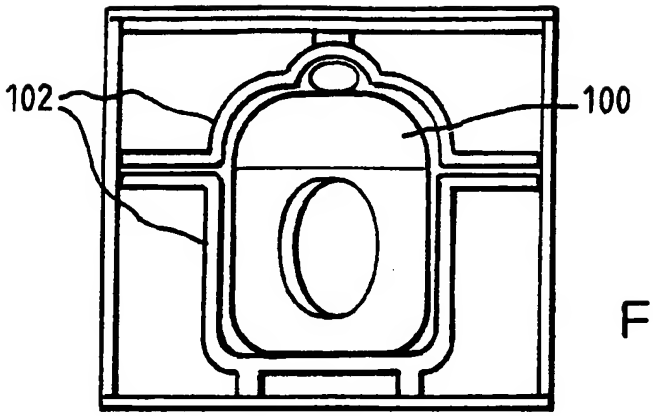

FIG.4a

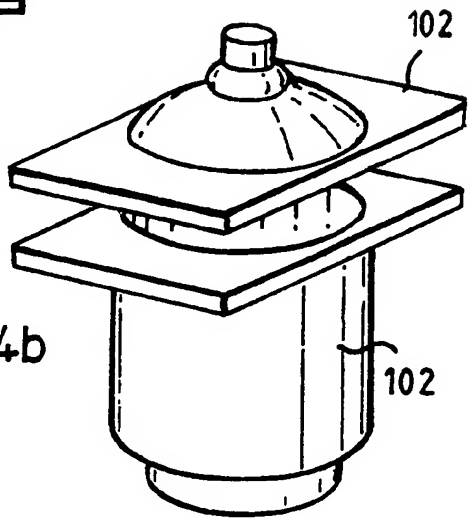

FIG.4b

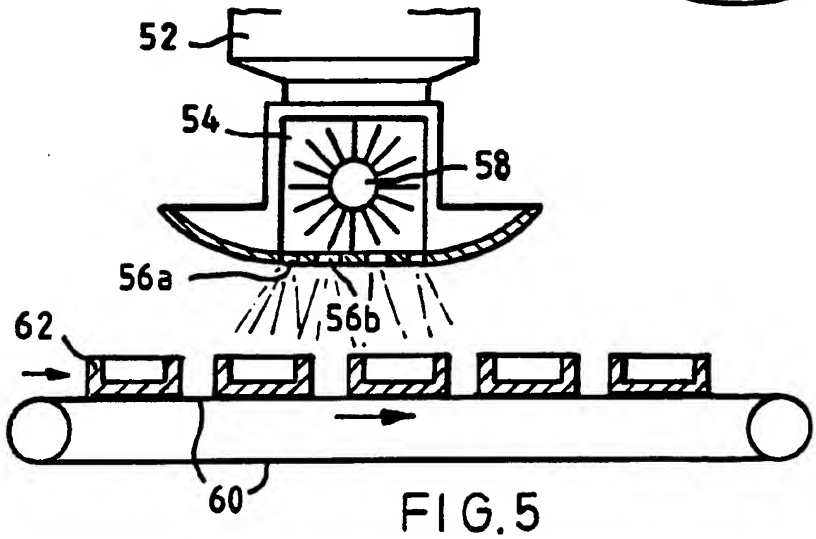

FIG.5

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ORGANIC MATERIAL

This invention relates to an organic material and particularly but not exclusively to an organic material which can, depending upon its composition, be employed as a packaging material and/or a growing medium.

It is estimated that one third of waste materials generated in the world to today are in the form of discarded packaging materials. The generation of waste represents a serious ecological threat. It is, therefore, highly desirable to reduce the amount of waste generated as a result of discarded packaging materials. The present invention sets out to provide a material which is highly efficient for packaging purposes but can be readily re-used. The invention also sets out to provide a material which can be bio-degradable and/or used as a growing medium.

According to a first aspect of the present invention there is provided an organic material formed from coir dust mixed with a binding agent.

The binding agent may be wood pulp, paper pulp, latex or PVA. The coir dust may be treated with fertiliser.

The invention also provides a packaging member formed by filling a void between two retaining layers with coir dust. The coir dust may be treated with fertiliser.

According to the invention, there is also provided a packaging material comprising one or more of: sawdust, wood chips, bark, wood waste, charcoal, peat, shells, olive residues, coir dust, coffee hulls, coconut fibre, sunflower husks, cottonseed husks, hazelnut shells, bagasse, malt sprouts, rice husks, or municipal waste.

The invention also provides a method of forming an organic material comprising mixing coir dust with a binder.

According to a second aspect of the invention, there is provided a growing medium for plants or animal bedding comprising coir dust.

According to the second aspect of the invention, there is also provided an organic material comprising coir dust bonded to a substrate.

According to the second aspect of the invention there is also provided a method of forming an organic material comprising bonding coir dust to a substrate.

Thus an embodiment of the invention allows discarded packaging material to be re-used as:-

- a growing medium
- fuel for cooking or heating
- a soil conditioner to be used as an additive for marshy land
- for trapping and holding of pesticide movement in soil and for degradation by useful micro organisms
- for the manufacture of light-weight building bricks
- as an absorbent in animal or poultry farms
- for production of combustible gas
- for manufacture of cemented articles
- for the production of fuel briquettes for firing steam generators

The use of coir dust is particularly advantageous. Coir dust can absorb up to 10 times its own weight of liquid and is an excellent shock absorber.

Figure 1 is a schematic view of a latex-coating apparatus for use in association with a fifth embodiment of the invention;

Figure 2 is a schematic view of a pellet-forming apparatus, for use in association with a sixth embodiment of the invention;

Figures 3a and 3b are perspective views of solid fill packaging members and a product to be packed;

Figures 4a and 4b are a cross-sectional side elevation and a perspective view of a hollow packaging members and a product to be packed; and.

Figure 5 is a schematic view of a flock coating apparatus.

The coir dust is first treated. An example of treatment is given below.

Example 1

Initially, the coir dust was dried naturally under ambient conditions. Forced drying could be used as an alternative. Once dried, the coir dust was fumigated for four hours to destroy active plants, residue and micro-organisms. This was carried out by subjection to heat, although a chemical vapour treatment could be used instead. After fumigation the coir dust was ground and graded so that 80% passed a 60/80 mesh size.

After treatment, the coir dust is subjected to a variety of further treatments depending upon the end use.

In the first aspect of the invention the coir dust is used to form a packaging material.

In the first three embodiments of the invention the coir dust is mixed with paper pulp and/or recycled paper as a binder. In each case, the mixing is performed mechanically and the packaging is formed by moulding, with the working surface being shaped by vacuum-forming. A vacuum of 50 cm Mg held for about 60 seconds allows close bonding of the surface area.

In the first embodiment, the coir dust represents 80 to 90% of the mixture.

The resultant material is elastically deformable and may be used for:

a) encapsulation and moisture retention of seedling or cuttings;

b) open containers for plants;

c) split containers for fragile articles;

d) split (sealable) containers for protecting glassware and other materials containing liquids (including hazardous materials).

In a second embodiment coir dusts represents 60 to 80% of the mixture. The packaging is shaped in the same manner as the packaging of the first embodiment. The resultant material is permanently deformable and may be used for packing sturdy, hard products.

In a third embodiment, coir dust represents 50 to 60% of the overall mixture.

The packaging material thus produced can be formed into pieces for loose filling protection (such as kadunut shaped pieces). This material may also be formed into corner pads, dividers and other internal low-cost packaging.

The use of paper in the above embodiments allows the colour and general aesthetic appearance of the material to be enhanced (coir dust alone is mono-coloured). The use of paper is also particularly advantageous in the manufacture of packaging for horticultural products and absorbent products, since the manufactured packaging will absorb spillage, and can retain moisture in such a manner as to accelerate the growth of plants. The use of wood pulp as a binder provides similar advantages.

The packaging materials of the above three embodiments can be enhanced by the application of a paper skin, which may be water repellent if desired. The paper is applied at the forming stage.

The materials formed in the above three embodiments are combustible and biodegradable. The material can be re-used as a planting medium instead of peat (which is banned in certain countries for environmental and ecological reasons). Furthermore, because the material can be used as a packaging material and as a growing medium, this removes the need for transporting both - saving transport costs.

In the fourth embodiment of the invention coir dust is mixed with PVA. The PVA acts as a binder and represents from 3 to 10% of the overall mixture. This forms a hard material which can be used for inner or outer packaging either in board form or in the form of a perforated container. The material can be formed by a process similar to that used in the first three embodiments of the invention described above.

In a fifth embodiment of the invention, coir dust is mixed with latex as a binder. The latex may be natural or artificial, and represents 5 to 10% of the overall mixture.

The coir dust is coated with latex in free fall, suspended in a forced air-draught as shown in Figure 1.

The apparatus shown in figure 1 comprises a hopper 2, in which the coir dust is stored and a free fall chute 4. Coir dust is allowed to fall into the chute 4 from the hopper. A nozzle 6 is located in the centre of the chute 4 and latex is sprayed into the chute 4 via the nozzle 6. The latex then coats the coir dust.

Once coated, the coir dust forms a deposit having a sponge-like configuration. The deposit is formed into packaging material either by direct impression of the packaged product or by using a mould in the shape of the packaged product. Vacuum forming can be used to improve surface texture and a paper skin can be added as described in relation to the first three embodiments of the invention.

In a sixth embodiment of the invention, the deposit such as formed in the fifth embodiment of the invention is made into packaging members or loose-fill pellets.

To form loose-fill pellets, coir dust is allowed to fall onto an inclined rotating table as shown in Figure 2.

The apparatus shown in figure 2 comprises a hopper 2, for storage of coir dust, and a chute 4. An inclined rotating table 8 is located at the bottom of the chute 4. A series of nozzles 6a,6b etc., are situated outside the chute 4 but above the table 8. A drive motor 10 drives the table 8 via a belt 12. The motor 10 causes the table 8 to rotate and coir dust is released from the hopper 2 on to the table 8 via the chute 4. Adhesive is sprayed onto the dust on the table 8, as the table rotates, via the nozzles 6a,6b. The rotating action of the table 8 causes the coir dust to form into small pellets bound by the adhesive.

Where coir dust is formed into pellets, this avoids the need for full contact moulding, thereby reducing moulding costs.

The materials formed in accordance with the above embodiments of the invention may be formed into packaging members. Packaging members are used to support a product during transit and may be provided within an outer container.

The packaging member may be solid, so as to completely fill an outer container, as shown in Figures 3a and 3b. Alternatively, the packaging member can be hollow for increased lightness, as shown in Figure 4a and Figure 4b. In each figure, the product to be packed is designated 100 and the packaging member(s) 102.

The above described packaging materials are effective due to the fact that the coir dust has a good shock absorbency and the overall resilience of the members protects the products and absorbs shock loads in transit. Because coir dust is capable of holding up to ten times its own weight in water, the above described packaging materials are also capable of absorbing liquid if a product leaks during transit.

In a seventh embodiment of the invention, an inner container is situated within an outer container and the space between the two is filled with coir dust. This packaging material can be constructed to achieve desired moisture absorbency and resiliency qualities, *inter alia* by selection of the materials forming the inner and outer containers and the separation between the two containers.

In an eighth embodiment of the invention, bonded coir dust packaging material such as described in relation to the first six embodiments of the invention is formed into the shape of flower pots. The packaging material is re-used as a planting medium or moisture retaining material without discarding it as waste packaging. As an alternative to flower pots, the packaging material can be formed into any shape determined by the requirements of plant growers or transit conditions, e.g. a growing tray. The material may be impregnated with fertiliser.

The above described packaging materials can be coloured by impregnating or mixing colour pigment into the base mixture. However, if colour is added for aesthetic reasons, the degree of coloration required can be reduced by making use of flocking. This is desirable since using colour pigments can represent an environmental or ecological hazard. To achieve this, effect flock piles are implanted on the packaging, thereby serving to improve colour and feel and also improve the contact relationship between the product and the packaging.

Apparatus for producing flocking is shown in Figure 5.

In the apparatus shown in figure 5, a hopper 52 is situated above a chute 54. A dispersing brush 56 is situated in the chute 54. At the bottom of the chute a series of apertures 56a,56b etc., are provided. A conveyor belt 60 is positioned beneath the apertures 56a,56b etc. In use, adhesive coated packaging members 62 are fed beneath the apertures 56a,56b etc., by the belt 60. At the same time electrostatically charged flock piles fall from the hopper 52 into the chute 54. In the chute, they are dispersed by the dispersing brush 58 so as to fall evenly from the apertures 56a,56b etc. The even fall of flock piles fall onto the packaging members 62, where they are held in place by the adhesive, to form a coating.

In a second aspect of the invention, coir dust impregnated with fertiliser is used as a bedding for plant cuttings, flowers, plants, insects, other living organisms or seeds, which are stored or retained within the moisture impregnated coir dust for transport and/or storage and/or growth. Alternatively, the coir dust need not be fertilised. The coir dust may be used in nurseries.

According to a second embodiment of the second aspect of the invention, coir dust is impregnated with moisture and is bonded to leak-proof paper. The resulting structure

is used as a transport and storage medium which can be particularly adapted to suit the moisture retention qualities required by the product. The leak proof paper may be replaced with an alternative substrate depending upon conditions of use.

Coir dust is inherently absorbent. This feature is disadvantageous in adhesive application in two ways.

1. The adhesive is absorbed by the coir dust micro-sponges and the cushioning effect and lightness is diminished.

2. A large portion of the adhesive is absorbed rather than coating the external surface, where it is needed.

Therefore there is both an adhesive waste and a decrease in effectiveness.

To avoid this, the coir dust surface is coated with Teepol, or a similar substance. This reduces the sub-surface absorbency and hence adhesive absorbed while retaining good surface bonding properties between the coir dust and the adhesive.

Although the above description has been concerned mainly with the use of coir dust, alternative materials may be used instead of coir dust. Examples of these are as follows: sawdust, wood chips, bark, wood waste, charcoal, peat, shells, olive residues, coffee hulls, coconut fibre, sunflower husks, cottonseed husks, hazelnut shells, bagasse, hemp, straw, flax, plant stalks, paper waste, malt sprouts, rice husks and municipal waste.

Many further modifications and variations will suggest themselves to those versed in the art upon making reference to the foregoing description, which is not intended to limit the scope of the invention in any way, the scope of the invention being determined

by the appended claims.

Claims

1. An organic material formed from coir dust mixed with a binding agent.

2. An organic material according to claim 1, wherein the binding agent is latex or PVA.

3. A material according to claim 2, wherein from 5 to 10% of the mixture is latex.

4. A material according to claim 2, wherein from 3 to 10% of the mixture is PVA.

5. An organic material according to claim 1, wherein the binding agent is wood pulp, paper pulp or paper.

6. A material according to claim 5, wherein from 80 to 90% of the mixture is coir dust.

7. A material according to claim 5, wherein from 60 to 80% of the mixture is coir dust.

8. A material according to claim 5, wherein from 50 to 60% of the mixture is coir dust.

9. An organic material according to any preceding claim wherein the coir dust is treated with fertiliser.

10. An organic material according to any preceding claim, wherein flock piles are situated on an outer surface of the material.

11. A packaging member formed from an organic material according to any preceding claim.

12. A packaging member according to claim 12, shaped to form a horticultural or agricultural growing receptacle.

13. A packaging member according to claim 11, shaped to form a flower pot.

14. A packaging material according to any one of claims 1 to 10, shaped to form granules or pellets.

15. A packaging member according to claim 11, shaped to contact an article to be packed in the packaging member closely.

16. A packaging member formed by filling or partially filling a void between two retaining layers with coir dust.

17. A packaging member according to claim 16, wherein the coir dust is treated with fertiliser.

18. An organic material comprising coir dust bonded to a substrate.

19. A material according to claim 18 wherein the substrate is leak-proof paper.

20. A material according to claim 18 or 19, wherein the coir dust is treated with fertiliser and/or moisture.

21. A growing medium for plants or animals comprising coir dust.

22. A growing medium according to Claim 21, wherein the coir dust is treated with fertiliser.

23. A packaging material comprising one or more of: sawdust, wood chips, bark, wood waste, charcoal, peat, shells, olive residues, coir dust, coffee hulls, coconut fibre, sunflower husks, cottonseed husks, hazelnut shells, bagasse, malt sprouts, rice husks, or municipal waste.

24. A packaging material substantially as herein described.

25. A packaging member substantially as herein described.

26. A method of forming an organic material comprising mixing coir dust with a binder.

27. A method according to claim 26, wherein the binder is latex.

28. A method according to claim 27, wherein from 5 to 10% of the mixture is latex.

29. A method according to claim 26 wherein the binder is PVA.

30. A method according to claim 29, wherein from 3 to 10% of the mixture is PVA.

31. A method according to any one of claims 26 to 30 wherein the coir dust is suspended and sprayed with the binder.

32. A method according to claim 26, wherein the binder is paper, paper pulp or wood pulp.

33. A method according to claim 32 wherein from 80 to 90% of the mixture is coir dust.

34. A method according to claim 32, wherein from 60 to 80% of the mixture is coir dust.

35. A method according to claim 32, wherein from 50 to 60% of the mixture is coir dust.

36. A method according to any one of claims 26 to 35, comprising the additional step of applying a paper skin.

37. A method according to any one of claims 26 to 36, comprising the additional step of treating the mixture with fertiliser.

38. A method of forming an organic material comprising bonding coir dust to a substrate.

39. A method according to claim 38 wherein the substrate is leak-proof paper.

40. A method according to Claim 38 or 39 comprising the additional step of applying fertiliser and/or moisture to the coir dust.

41. A method of forming an organic material substantially as described herein.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9318410.9
Relevant Technical Fields (i) UK Cl (Ed.L) C3N; C1B (BBL); A2B (BMA9) (ii) Int Cl (Ed.)	Search Examiner K MacDonald Date of completion of Search 12 October 1993
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE DATABASES : WPI	Documents considered relevant following a search in respect of Claims :- 21,22

Categories of documents

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E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

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Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2246566 A	(SINCLAIR) Claim 11	at least Claim 21
X	GB 2139609 A	(CHEMICAL DISCOVERIES)	" "
X	GB 2137609 A	(LAWRENCE)	" "
X	GB 1003098	(CARONI)	" "
X	GB 0195263	(HARVEY)	" "
X	GB 0179055	(HARVEY)	" "

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9318410.9
Relevant Technical Fields (i) UK Cl (Ed.L) C3N : B8C (CWP1,CWS5) B8P (PE2B,PE2D,PE2H,PK14) (ii) Int Cl (Ed.)	Search Examiner K MacDonald Date of completion of Search 12 October 1993
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE DATABASES : WPI	Documents considered relevant following a search in respect of Claims :- 23

Categories of documents

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- **&:** Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 1347745	(BOFFET) page 2, lines 61-66	Claim 23
X	GB 0966623	(GOULD)	Claim 23
X	GB 0770435	(LIMEHOUSE)	Claim 23
X	GB 0744621	(McMURDO) Claim 10	Claim 23
X	GB 0558706	(FIFER) Claim 1	Claim 23
X	GB 0414407	(HEER) page 2, line 35	Claim 23
X	GB 0305739	(JONES) page 1 lines 83-89	Claim 23
X	GB 0113656	(MICHAELSON)	Claim 23

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Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE DATABASES : WPI	Documents considered relevant following a search in respect of Claims :- 1-15,26-37

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Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2139609 A	(CHEMICAL DISCOVERIES)	at least Claims 1 & 26
X	GB 0850966	(SEMTEX) Claim 1; page 1; lines 39-43	" "
X	GB 0591403	(DUNLOP RUBBER) Claim 1; page 3, line 48	" "
X	GB 0397219	(HAYES-GRATZE) Claim 1; page 3, line 24	" "
X	GB 0195263	(HARVEY)	" "
X	GB 0179055	(HARVEY)	" "

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&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
X	GB 0770435 (LIMEHOUSE)	at least Claim 16

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Relevant Technical Fields (i) UK Cl (Ed.L) C3N; C1B (BBL); B2E (EKB,EM) (ii) Int Cl (Ed.)	Search Examiner K MacDonald Date of completion of Search 12 October 1993
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE DATABASES : WPI	Documents considered relevant following a search in respect of Claims :- 18-20,38-40

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Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2139609 A	(CHEMICAL DISCOVERIES)	at least Claims 18 & 38
X	GB 0850966	(SEMTEX) Claim 1; page 1, lines 39-43	" "
X	GB 0470345	(BARKER)	" "

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